

5

Treatment Manual

Treatment Schedules

T400 - Schedules for Miscellaneous Products

Contents

Commodities treated with the following schedules are not to be used for food or feed.

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Exposure period may be extended for any commodity which *cannot* be used for food or propagation. This extension is only a matter of convenience for the importer and is intended only for the purpose of reducing treatment costs. The request for extension must come from the importer or his authorized representative and should be confirmed in writing. A letter is not required for each treatment. A single blanket request should be considered as acceptable and renewed each year as required.

During the extended exposure period, the concentrations must remain stable and the prescribed minimums be met at the end of the extension. Otherwise, the treatment may be voided and retreatment required. Examples of commodities for which extended exposure periods may be approved include cotton piece goods, baled cotton, bagging, wood, marble, soil as such, etc. Examples of commodities for which *no* extension may be approved include cottonseed, grain, tobacco, etc. An extension of exposure period for other purposes is not permitted except as may be prescribed in various schedules for concentration readings below minimum.

Additional safety precautions, including additional aeration, may be required because of the extended exposure period. The PPQ officer or the commercial fumigator will specify any needed safety precautions.

T401—Railroad Cars (Empty)

T401-a Railroad cars (empty)

Pest: *Pectinophora gossypiella* (pink bollworm) and fruit flies

Treatment: T401-a—MB ("Q" label only) at NAP

Temperature	Dosage Rate (lb/1,000 ft ³)	Exposure Period
40°F or above	4 lbs	12 hrs
OR	8 lbs	3 hrs

T401-b Railroad cars (empty)

Pest: *Trogoderma granarium* (khapra beetle)

Treatment: T401-b—MB ("Q" label only) at NAP—tarpaulin covered car

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:		
		0.5 hr	2 hrs	12 hrs
90°F or above	2.5 lbs	30	20	15
80-89°F	3.5 lbs	42	30	20
70-79°F	4.5 lbs	54	40	25
60-69°F	6 lbs	72	50	30
50-59°F	7.5 lbs	90	60	35
40-49°F	9 lbs	108	70	40

T401-c Railroad cars (empty)

Pest: For nematode cysts

Treatment: T401-c—High pressure steam cleaning *or* formaldehyde wetting spray (1 part 40% commercial formalin to 9 parts water).



Under FIFRA Section 2(ee), it is permissible to use a method of application not prohibited by the labeling unless the labeling specifically states that the product may be applied only by the methods specified on the labeling. Therefore, a wetting spray may be used in this case if the label refers to the application of formaldehyde as a fumigant and does not specifically restrict the method of application to fumigation."

The debris and/or runoff from the cleaning procedure must be handled in a manner approved by local and port authority guidelines.

T402—Ships, Containers, and Surrounding Area

T402-b-3-2 Asphalt surfaces and asphalt-base painted surfaces

Pest: *Trogoderma granarium* (khapra beetle)

Treatment: T402-b-3-2—Malathion spray at 2 gal/1,000 ft² or to the point of runoff.

Asphalt surface, asphalt-base paint—3% spray prepared by adding 1 lb. of 25% malathion wettable powder to each gal. of water.

T402-c Empty holds (precautionary treatment for grain exports)

Pest: Without khapra beetle infestation

Treatment: T402-b—MB at NAP

Temperature	Dosage Rate (lb/1,000 ft ³)	Exposure Period
60°F or above	1 lb	10 hrs
50-59°F	1 lb	12 hrs
40-59°F	1.5 lbs	12 hrs



Operate fans during gas introduction and for 30 minutes thereafter. During exposure period, operate fans for 30 minutes every 3 hours.



If khapra beetle is present, see [T401-b](#) on [page 5-5-2](#).

T402-b-3-1 Metal and wood surfaces such as decks, bulkheads, piers, and other areas not subject to fumigation

Pest: *Trogoderma granarium* (khapra beetle)

Treatment: T402-b-3-1—Malathion spray at 2 gal/1,000 ft² or to the point of runoff.

Metal and wood surfaces—3% spray prepared by mixing 1/2 pt. emulsifiable concentrate (57% premium grade malathion) per gal. of water.

Malathion is toxic to fish, birds, and other wildlife. Keep out of lakes, streams, ponds, tidal marshes, and estuaries. Do **not** apply where fish and other aquatic life are important resources or where water is used for irrigational purposes, recreational purposes, or domestic purposes. Do **not** apply where runoff is likely to occur.

T402-d

Ship decks (metal, concrete, asphalt, or wood)

Pest: Miscellaneous hitchhiking insects (e.g., crickets, scarab beetles, ants, Africanized honey bee swarms)

Treatment: T402-d—Residual insecticidal spray (1% to 5% strength, according to label directions), using malathion, chlorpyrifos, or cyfluthrin (Tempo)

Apply the insecticide to dry surfaces as a fine spray or mist, according to the manufacturer's label. Direct the spray to areas on the decks where the insects congregate, with special attention to corners, cracks, and crevices.



Do not treat freshly painted surfaces.

Avoid pooling or runoff. If rain is imminent, use a spreader-sticker in the spray mixture, or postpone spraying weather-exposed decks until the storm has passed and the decks have thoroughly dried. Submarines are exempt from treatment.



Do not release the ship from quarantine until the application has dried, and no live insects are seen.

If the insects are capable of flight (e.g., scarab beetles), the ship must move offshore for at least one mile (which is beyond the normal flight range of most insects) while the insecticide is being applied.

T402-a-1

Ship holds and any nonplant cargo material within holds

Pest: Quarantine significant snails of the family Achatinidea, including the following genera:

Achatina *Lignus*
Archachatina *Limicolaria*

Treatment: T402-a-1—MB (“Q” label only) at NAP

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:		
		0.5 hr	2 hrs	24 hrs
55°F or above	8 lbs	96	65	35

T402-a-2

Ship holds and any nonplant cargo material within holds

Pest: Quarantine significant snails of the family Hygromiidae, including the following genera:

Canidula *Monacha* *Xeropicta*
Cernuella *Platytheba* *Xerosecta*
Cochlicella *Pseudotrichia* *Xerotricha*
Helicella *Trochoidea*
Helicopsis *Xerolenta*

Treatment: T402-a-2—MB (“Q” label only) at NAP

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:				
		0.5 hr	2 hrs	24 hrs	48 hrs	72 hrs
55°F or above	8 lbs	95	64	62	60	40

T402-a-3

Ship holds and any nonplant cargo material within holds

Pest: Quarantine significant snails of the families Helicidae and Succineidae, including the following genera:

Caracollina *Omalonyx*
Cepaea *Otala*
Cryptomphalus *Succinea*
Helix *Theba*

Treatment: T402-a-3—MB (“Q” label only) at NAP

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:					
		0.5 hr	2 hrs	10 hrs	12 hrs	16 hrs	24 hrs
80°F or above	6 lbs	70	48	40	—	—	—
55-79°F	6 lbs	70	48	—	—	40	—
40-54°F	8 lbs	96	64	—	—	—	39

T402-b-1

Ship holds and storerooms that do not contain finely milled products such as flour or appreciable quantities of tightly packed cargo such as baled materials

Pest: *Trogoderma granarium* (khapra beetle)

Treatment: T402-b-1—MB (“Q” label only) at NAP—tarpaulin covered car

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:		
		0.5 hr	2 hrs	12 hrs
90°F or above	2.5 lbs	30	20	15
80-89°F	3.5 lbs	42	30	20
70-79°F	4.5 lbs	54	40	25
60-69°F	6 lbs	72	50	30
50-59°F	7.5 lbs	90	60	35
40-49°F	9 lbs	108	70	40

T402-b-2

Ship holds and storerooms that contain milled products, or with appreciable quantities of tightly packed or baled material

Pest: *Trogoderma granarium* (khapra beetle)

Treatment: T402-b-2—MB (“Q” label only) at NAP

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:		
		0.5 hr	4 hrs	24* hrs
90-96°F	4 lbs	48	35	25
80-89°F	6 lbs	72	50	30
70-79°F	8 lbs	96	65	35

*In addition to the space concentration readings, you must take a commodity concentration reading. The minimum concentration reading for commodity reading is as follows: For 90-96°F—10 oz.; for 80-89°F—15 oz.; for 70-79°F—20 oz.;



Important

Concentration readings not required for chamber fumigation.



Important

Some ships’ masters or agents prefer to abandon flour or other finely milled products to qualify for the 12 hours schedule ([T401-b](#) on [page 5-5-2](#)). This practice should not be discouraged if PPQ approved incineration or steam sterilization facilities are available within the port city. Small quantities may be burned or boiled on board the vessel, but in no case should the material be removed from treatment in PPQ facilities. Such articles must be left in the storeroom during the 12-hour fumigation and then removed under PPQ safeguards. This will serve to reduce the possibility of pest dispersal when the articles are removed under PPQ supervision.

T403—Miscellaneous Cargo (Nonfood, Nonfeed Commodities)

T403-a-1 Miscellaneous cargo (non-food, non-feed commodities)

Pest: Quarantine significant snails of the family Achatinidae, including the following genera:
Achatina *Lignus*
Archachatina *Limicolaria*

Treatment: T403-a-1—use T402-a-1 for temperatures of 55°F and above, use T403-a-6 for temperatures below 55°F



Commodity or product temperature must reach treatment temperature before exposure time begins.

T403-a-2-1 Miscellaneous cargo (nonfood, nonfeed commodities)

Three alternative treatments

Pest: Quarantine significant snails of the family Hygromiidae, including the following genera:
Candidula *Monacha* *Xeropicta*
Cernuella *Platytheba* *Xerosecta*
Cochlicella *Pseudotrichia* *Xerotricha*
Helicella *Trochoidea*
Helicopsis *Xerolenta*

Treatment: T403-a-2-1—MB (“Q” label only) at NAP

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:			
		0.5 hr	2 hrs	48 hrs	72 hrs
55°F or above	8 lbs	95	64	60	40

T403-a-2-2 Miscellaneous cargo (nonfood, nonfeed commodities)

Treatment: T403-a-2-2—MB in 26" vacuum

Temperature	Dosage Rate (lb/1,000 ft ³)	Exposure Period
70°F or above	8 lbs	16 hrs

T403-a-2-3 Miscellaneous cargo (nonfood, nonfeed commodities)

Treatment: T403-a-2-3—Cold treatment (for temperatures below 55°F)

Temperature	Exposure Period
0°F	48 hrs

T403-a-3

Miscellaneous cargo (nonfood, nonfeed commodities)

Pest: Quarantine significant slugs of the families Agriolimacidae, Arionidae, Limacidae, Milacidae, Philomycidae, and Veronicellidae, including the following genera:

<i>Agriolimax</i>	<i>Leidyula</i>	<i>Pseudoveronicella</i>
<i>Arion</i>	<i>Limax</i>	<i>Sarasinula</i>
<i>Colosius</i>	<i>Meghimatium</i>	<i>Semperula</i>
<i>Deroceras</i>	<i>Milax</i>	<i>Vaginulus</i>
<i>Diplosolenodes</i>	<i>Pallifera</i>	<i>Veronicella</i>

Treatment: T403-a-3—MB at NAP

Temperature	Dosage Rate (lb/1000 ft ³)	Minimum Concentration Readings (ounces) At:	
		0.5 hr	2 hrs
90-96°F	1 lb	12	9
80-89°F	1.25 lbs	15	12
70-79°F	1.5 lbs	18	15
60-69°F	1.75 lbs	22	19

T403-a-4-1

Miscellaneous cargo (nonfood, nonfeed commodities)

Three alternative schedules

Pest: Quarantine significant snails of the family Helicidae, including the following genera:

<i>Caracollina</i>	<i>Helix</i>
<i>Cepaea</i>	<i>Otala</i>
<i>Cryptomphalus</i>	<i>Theba</i>

Treatment: T403-a-4-1—MB at NAP

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:					
		0.5 hr	2 hrs	10 hrs	12 hrs	16 hrs	24 hrs
80°F or above	6 lbs	70	48	40	—	—	—
55-79°F	6 lbs	70	48	—	—	40	—
40-54°F	8 lbs	96	64	—	—	—	39



Important

If the fumigation is done at a temperature range of 40 to 54°F, use Methyl Bromide Q gas only.

T403-a-4-2 Miscellaneous cargo (nonfood, nonfeed commodities)

Treatment: T403-a-4-2—MB (“Q” label only) in 26" vacuum

Temperature	Dosage Rate (lb/1,000 ft ³)	Exposure Period
70°F or above	6 lbs	6 hrs

T403-a-4-3 Miscellaneous cargo (nonfood, nonfeed commodities)

Treatment: T403-a-4-3—Cold treatment, use [T403-a-6-1](#) on page 5-5-10 for temperatures below 55°F

T403-a-5-1 Miscellaneous cargo (nonfood, nonfeed commodities)

Three alternative treatments

Pest: Quarantine significant snails of the families
Bradybaenidae and Succineidae, including the following
genera:
Bradybaena *Omalonyx*
Cathaica *Succinea*
Helicostyla *Trishoplita*

Treatment: T403-a-5-1—MB (“Q” label only) at NAP

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:			
		0.5 hr	2 hrs	10 hrs	16 hrs
80°F or above	6 lbs	72	48	40	—
40-79°F	6 lbs	70	48	—	40

T403-a-5-2 Miscellaneous cargo (nonfood, nonfeed commodities)

Treatment: T403-a-5-2—MB (“Q” label only) in 26" vacuum

Temperature	Dosage Rate (lb/1,000 ft ³)	Exposure Period
40°F or above	6 lbs	6 hrs

T403-a-5-3 Miscellaneous cargo (nonfood, nonfeed commodities)

Treatment: T403-a-5-3—Cold Treatment, use [T403-a-6-1](#) on page 5-5-10 for temperatures below 40°F



Important

Commodity or product must reach treatment temperature before exposure time begins.

T403-a-6-1 **Miscellaneous cargo (nonfood, nonfeed commodities)**

Three alternative treatments

Pest: Quarantine significant snails sensitive to Cold Treatment, members of the families Bradybaenidae, Helicidae, Helicellidae, Hygromiidae, and Succineidae, including the following genera:

<i>Bradybaena</i>	<i>Cochlicella</i>	<i>Trochoidea</i>
<i>Candidula</i>	<i>Helicella</i>	<i>Xerolenta</i>
<i>Cepaea</i>	<i>Helicostyla</i>	<i>Xeropicta</i>
<i>Cathaica</i>	<i>Theba</i>	<i>Xerosecta</i>
<i>Cernuella</i>	<i>Trishoplita</i>	<i>Xerotricha</i>

Treatment: T403-a-6-1—Cold Treatment

Temperature	Exposure Period
0°F	48 hrs

T403-a-6-2 **Miscellaneous cargo (nonfood, nonfeed commodities)**

Pest: Quarantine-significant snails sensitive to Cold Treatment, certain members of the family Helicidae, including the following genera:

<i>Helix</i>	<i>Otala</i>
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Treatment: T403-a-6-2—Cold Treatment

Temperature	Exposure Period
0°F	32 hrs
10°F	48 hrs

T403-a-6-3 **Miscellaneous cargo (nonfood, nonfeed commodities)**

Pest: Quarantine-significant snails sensitive to Cold Treatment, of the family Achatinidae, including the following genera:

<i>Achatina</i>	<i>Lignus</i>
<i>Archachatina</i>	<i>Limicolaria</i>

Treatment: T403-a-6-3—Cold Treatment

Temperature	Exposure Period
0°F	8 hrs
10°F	16 hrs
20°F	24 hrs

T403-b Miscellaneous cargo (nonfood, nonfeed commodities)

Pest: *Trogoderma granarium* (khapra beetle)

Treatment: T403-b—MB at NAP, use T401-b or T402-b-2

T403-c Miscellaneous cargo (nonfood, nonfeed commodities)

Pest: *Globodera rostochiensis* (golden nematode)

Treatment: T403-c—MB (“Q” label only) in 26" vacuum

Temperature	Dosage Rate (lb/1,000 ft ³)	Exposure Period
40°F or above	8 lbs	16 hrs
	10.5 lbs	12 hrs
	16 lbs	8 hrs

T403-d Miscellaneous cargo (nonfood, nonfeed commodities)

Pest: Wood Borers or termites

Treatment: T403-d see T404 schedules

T403-e-1-1 Miscellaneous cargo (nonfood, nonfeed commodities) that is not sorptive or difficult to penetrate

Pest: Quarantine-significant insects not specifically provided for elsewhere in non-food or non-feed commodities

Treatment: T403-e-1-1—MB (“Q” label only) at NAP—tarpaulin

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:		
		0.5 hr	2 hrs	12 hrs
90°F or above	2.5 lbs	30	20	15
80-89°F	3.5 lbs	42	30	20
70-79°F	4.5 lbs	54	40	25
60-69°F	6 lbs	72	50	30
50-59°F	7.5 lbs	90	60	35
40-49°F	9 lbs	108	70	40

T403-e-1-2 **Miscellaneous cargo (nonfood, nonfeed commodities) that is sorptive or difficult to penetrate**

Pest: Quarantine-significant insects not specifically provided for elsewhere in nonfood or nonfeed commodities

Treatment: T403-e-1-2—MB (“Q” label only) at NAP

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:				
		0.5 hr	4 hrs	24 hrs	28 hrs	32 hrs
90-96°F	4 lbs	48	35	25*	—	—
80-89°F	6 lbs	72	50	30*	—	—
70-79°F	8 lbs	96	65	35*	—	—
60-69°F	12 lbs	144	95	50*	—	—
50-59°F	12 lbs	144	95	—	50*	—
40-49°F	12 lbs	144	95	—	—	50*

*In addition to the space concentration readings, you must take a commodity concentration reading. The minimum concentration reading for commodity reading is as follows: For 90-96°F—10 oz.; for 80-89°F—15 oz.; for 70-79°F—20 oz.; for 60-69°F—30 oz; for 50-59°F—30 oz; and 40-49°F—30 oz.

This fumigation schedule may be used, for example, on finely milled products and on material that is tightly packed or baled.

T403-e-2 **Miscellaneous cargo (nonfood, nonfeed commodities) that is not sorptive or difficult to penetrate**

Pest: Quarantine-significant pests other than insects



This would include quarantine-significant snails of the families Helicarionidae, Streptacidae, Subulinidae, and Zonitidae, as well as other noninsect pests.

Treatment: T403-e-2—MB (“Q” label only) at NAP tarpaulin or chamber

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:			
		0.5 hr	2 hrs	24 hrs	48 hrs
40°F or above	10 lbs	140	130	120	80

T403-f

Miscellaneous cargo (nonfood, nonfeed commodities)

Pest: *Pieris* spp. (cabbageworms—all life stages) and all other *Lepidoptera**. Also hitchhiking insects, including non-*Lepidoptera*.

Treatment: T403-f—MB at NAP

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:	
		0.5 hr	3 hrs
70°F or above	3 lbs	36	16
60-69°F	3.5 lbs	40	19
50-59°F	4 lbs	45	21
45-49°F	4.5 lbs	49	24
40-44°F	5 lbs	54	27



*A 3-hour exposure easily kills all Lepidopterous hitchhikers, including gypsy moth, and is preferred over using the much longer schedules that are aimed more at khapra beetles (T404-b-1 and T402-b-2). This schedule should not be used for mollusks (snails and slugs) or for any insect with cryptic habits (e.g., ants or borers), or for insects in diapause.

T404—Wood Products Including Containers¹

T404-b-5-1

Metal, wood, concrete, or other surfaces not subject to fumigation

Pest: Borers (wood wasps, Cerambycids, and Dinoderus)

Treatment: T404-b-5-1—Chlorpyrifos spray

Use Dursban 4E as a 1% chlorpyrifos spray using suitable hand- or power-operated ground spray equipment. To be applied only by or under the supervision of pest control operators or other trained personnel responsible for insect control programs.

To prepare the spray, thoroughly mix 79 ml (2-2/3 fl oz) of Dursban 4E with water to make up a total of 1 gal. of mixture (equivalent to 2.1 gal. in 100 gal. of water) and spray to the point of runoff.

¹ Use Treatment Schedule [T404-d](#) on page 5-5-19 for the fumigation of any bamboo products.

T404-c-2

Wood products including containers

Pest: Termites (for borers see T404-b-1-1 and T404-b-1-2)

Treatment: T404-c-2—SF at NAP

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:			
		0.5 hr	2 hrs	16 hrs	24 hrs
70°F or above	1 lb	12	8	8	—
60-69°F	1.5 lbs	18	12	—	8
50-59°F	2.5 lbs	32	20	—	20

Do not use filters containing sodium hydroxide (Ascarite®) with this fumigant.

T404-a

Wood products including containers

Pest: *Globodera rostochiensis* (golden nematode)

Treatment: T404-a—MB (“Q” label only) in 26" vacuum

Temperature	Dosage Rate (lb/1,000 ft ³)	Exposure Period
40°F or above	8 lbs	16 hrs
	10.5 lbs	12 hrs
	16 lbs	8 hrs

T404-b-1-1

Wood products including containers



Ascarite® filter must be mounted on the T/C Analyzer when taking concentration readings for the following Mb-NAP treatments.

Four alternative treatments

Pest: See following pest list for T404-b-1-1, T404-b-1-2, and T404-b-4

Treatment: T404-b-1-1—MB at NAP—tarpaulin or chamber

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:			
		0.5 hr	2 hrs	4 hrs	16 hrs ¹
70°F or above	3 lbs	36	30	27	25
40-69°F	5 lbs	60	51	46	42

- 1 If the 4- and 16-hour readings would occur outside of normal working hours, then the fumigation may be extended to a total of 24 hours, instead of 16. In that case, the 24-hr minimum concentration reading would be 25 (for the initial 3-lb dosage), or 42 (for the initial 5-lb dosage).



For termites use T404-c schedules.



1. Minimum concentration must be met in chamber fumigations of sorptive materials. (see Section I, Part 2, I for list of sorptive materials.)
2. For fumigating of hardboard (Masonite), an initial dosage of 10 lb/1,000 ft³ is recommended. Inspector should be prepared to provide extra attention to maintaining minimum concentrations when fumigating this commodity.
3. If both termites and borers are present at 40-69°F, use the schedule for borers with exposure extended to 20 hours. Use same minimum concentrations.
4. Use an Ascarite filter (in addition to a Drierite filter) if either of the following conditions apply:
 - The wood is uncured ("green").
 - The wood is manifested as guatamba wood.In the two cases above, water vapor or other gases may be evolved during the fumigation, which give false (additive) readings on the T/C gas analyzer.
5. If the 4- and 16-hour readings would occur outside of normal working hours, then the fumigation may be extended to a total of 24 hours, instead of 16. In that case, the 24-hr minimum concentration reading would be 25 (for the initial 3-lb dosage), or 42 (for the initial 5-lb dosage).
6. Resume use of fans anytime a difference of 4 oz. or more occurs between the highest and lowest reading.
7. Readings more than 5 oz. below minimum at end of exposure negates treatment. For readings less than 5 oz. below minimum at the end of exposure period, add 2 oz/1,000ft³ for each ounce below minimum and extend exposure for 4 hours.
8. A reduction in dosage is allowed when fumigating nonsorptive commodities such as marble, shells, metal containers, etc., which have infested crating associated with them providing the following additional conditions are met:
 - Use only new 4-mil or 6-mil tarpaulins.
 - No truck trailer, van, or railroad car fumigations are permitted unless the carrier is covered with a 6-mil tarpaulin which is then sealed to the ground.
 - Use five or more sampling leads to determine minimum concentrations.
9. When fumigating wood commodities (e.g., dunnage, crating, logs) the proper fumigation temperature may be determined by inserting the tip of a dial thermometer or other temperature probe in a hole in the wood. A hole can be made with an electric or hand-powered drill or an awl. The hole diameter should be just large enough to insert the probe shaft (to lessen the influence of surrounding air). The depth should be 2 inches or half the thickness of the wood. Different areas of the load should be probed and the lowest temperature used in determining fumigation temperature. Determine the wood temperature 5 to 10 minutes after drilling the hole to allow the heat generated during drilling to dissipate.

T404-b-1-2

Wood products including containers

Pest: See following pest list for T404-b-1-1, T404-b-1-2, and T404-b-4

Treatment: T404-b-1-2—MB in 26" vacuum

Temperature	Dosage Rate (lb/1,000 ft ³)	Exposure Period
70°F or above	4 lbs	4 hrs
40-69°F	4 lbs	5 hrs

T404-b-2

Wood products including containers

Pest: Borers (wood wasps, carpenter ants, carpenter bees, and termites)

Treatment: T404-b-2—SF at NAP

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:						
		0.5 hr	2 hrs	4 hrs	12 hrs	16 hrs	24 hrs	32 hrs
70°F or above	4 lbs	48	45	40	—	32	—	—
60-69°F	4 lbs	48	45	40	36	—	32	—
50-59°F	5 lbs	60	56	52	48	—	40	—
40-49°F	6.5 lbs	76	71	66	60	—	52	—
OR	5 lbs	60	57	53	49	—	44	40



Do not use a filter containing sodium hydroxide (Ascarite®) with this fumigant.

Sulfuryl Fluoride (SF) is **NOT** an approved quarantine treatment for wood-boring beetles because SF has difficulty in penetrating insect eggs; therefore, many eggs will still hatch following fumigation. SF treatment of wood should be authorized only for brood-tending species of insects such as termites, bees, wasps, and ants. Even if all eggs are not killed, the hatching larvae will die of starvation, due to lack of care.

T404-b-4

Wood products including containers

Pest: See following pest list for T404-b-1-1, T404-b-1-2, and T404-b-4

Treatment: T404-b-4—Kiln Sterilization

Dry bulb temperature	Wet bulb depression	Relative humidity	Moisture content	Thickness of lumber	Exposure*
140°F	7°F	82%	13.8%	1 inch 2 inches 3 inches	3 hrs 5 hrs 7 hrs
130°F	16°F	60%	9.4%	1 inch 2 inches 3 inches	10 hrs 12 hrs 14 hrs
125°F	15°F	61%	9.7%	1 inch 2 inches 3 inches	46 hrs 48 hrs 50 hrs



Important

Use this pest list for T404-b-1-1, T404-b-1-2, and T404-b-4

Coleoptera (beetles):

Bostrichidae (branch and twig borers)
Buprestidae (metallic or flat-headed borers)
Cerambycidae (long-horned or round-headed borers)
Curculionidae (wood-boring and root-feeding weevils)
Lyctidae (powder-post beetles)
Lymexylonidae (ship timber beetles)
Passalidae (bess beetles)
Platypodidae (pin-hole borers)
Rhizophagidae (root-eating beetles)
Salpingidae (narrow-wasted bark beetles)
Scolytidae (bark/engraver beetles; also ambrosia/timber beetles)
Trogositidae (Bark-gnawing beetles)

Hymenoptera (bees, wasps, and ants):

Formicidae (carpenter ants)
Orussidae (parasitic wood wasps)
Siricidae (wood wasps)
Syntexicae (incense-cedar wood wasps)
Xylocopidae (carpenter bees)
Xyphidiidae (wood wasps)

Isoptera (termites)

Lepidoptera (moths):

Cossidae (carpenter worms)
Sesiidae (clear-winged moths)

T404-c-1-1

Wood products including containers



Ascarite® filter must be mounted on the T/C Analyzer when taking concentration readings for the following Mb-NAP treatments.

Two alternative treatments

Pest: Termites



For borers, see [T404-b-1-1](#) on [page 5-5-14](#).

Treatment: T404-c-1-1—MB at NAP—tarpaulin or chamber

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:				
		0.5 hr	2 hrs	4 hrs	16 hrs	24 hrs
40°F or above	3 lbs	36	30	27	25	24



1. Minimum concentration must be met in NAP chamber fumigations of sorptive materials. (see [Sorption](#) on [page 2-3-6](#) for a list of sorptive materials.)
2. If both termites and borers are present at 40°F–60°F, use the schedule for borers with exposure extended to 20 hours. Use same minimum concentrations.
3. Guatamba wood squares and green wood may emit a gas which gives a reading additive to MB on the fumiscope. Use of a filter containing sodium hydroxide (Ascarite®) will eliminate this contaminative gas.

T404-c-1-2

Wood products including containers

Treatment: T404-c-1-2—MB in 26" vacuum

Temperature	Dosage Rate (lb/1,000 ft ³)	Exposure Period
70°F or above	4 lbs	3 hrs
40-69°F	4 lbs	4 hrs

T404-d

Wood products including containers



Ascarite® filter must be mounted on the T/C Analyzer when taking concentration readings for the following Mb-NAP treatments.

Pest: Borers and *Trogoderma granarium* (khapra beetle)

Treatment: T404-d—MB at NAP—tarpaulin or chamber

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:				
		0.5 hr	2 hrs	4 hrs	16 hrs ¹	24 hrs
80°F or above	3.5 lbs	36	33	30	25	17
70-79°F	4.5 lbs	50	45	40	25	22
60-69°F ²	6 lbs	65	55	50	42	29
50-59°F	7.5 lbs	80	70	60	42	36
40-49°F ³	9 lbs	85	76	70	42	42

- 1 If the 16-hour reading is **not** performed, the 24-hour reading **must** have the following minimum concentrations: For 80°F or above—25 oz.; for 70-79°F—25 oz.; for 60-69°F—42 oz; for 50-59°F—42 oz; and 40-49°F—42 oz.
- 2 Due to label restrictions, use MB-100 gas may not be used at 60°F or below.
- 3 MB Q-gas may be used at any temperature above 40°F.

T404-e - Approved marking for regulated wood packing material

The wood packing material² must be stamped in a visible location on each article, with a legible and permanent mark that indicates the article has met the treatment required. The mark must be approved by the International Plant Protection Convention (IPPC). The currently approved mark shown in Figure 5-5-1 below. XX would be replaced by the country code, 000 by the producer number, and YY by the treatment type (HT or MB).

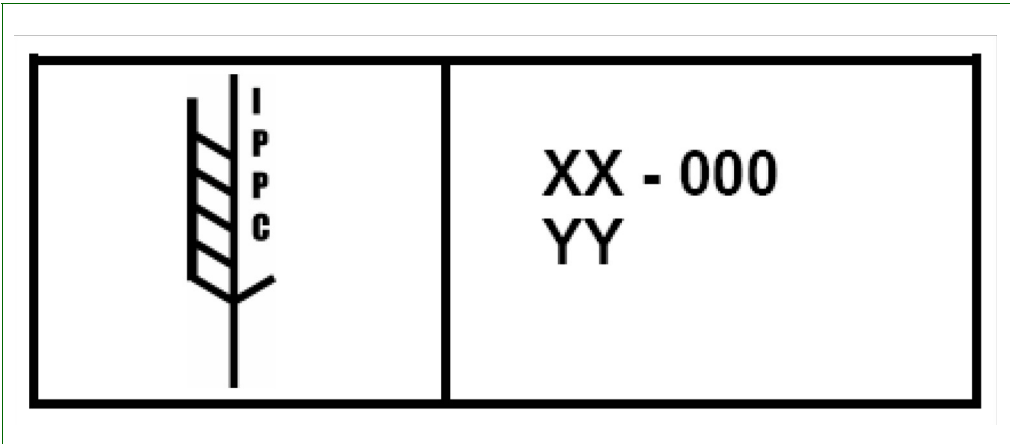


FIGURE 5-5-1 Example of International Plant Protection Convention Marking

T404-e-1

Regulated wood packing material (WPM)

Two alternative treatments

Pest: Various

Treatment: T404-e-1—MB at NAP—tarpaulin

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:				
		0.5 hr	2 hrs	4 hrs	16 hrs	24 hrs
69.8°F or above	3 lbs	36	36	31	28	24
61°-69.8°F	3.5 lbs	42	42	36	32	28
51.8°-61°F	4 lbs	48	48	42	36	32

2 Regulated wood packing material is defined as all types of wood packaging materials used for or for use with cargo to prevent damage, including, but not limited to, dunnage, crating, pallets, packing blocks, drums, cases, and skids. Excluded from the definition of wood packaging materials are:

- ◆ Pieces of wood that are less than 6mm or 0.24 inches in any dimension
- ◆ Loose wood packing materials, such as wood shavings, excelsior, etc.
- ◆ Processed wood packing materials that have received more than primary processing, such as plywood, corrugated board, fiberboard, veneer, whiskey and wine barrels, oriented strand boards, etc.

T404-e-2 Regulated wood packing material (WPM)

Pest: Various

Treatment: T404-e-2

Heat treatment to achieve a minimum core temperature of 56°C (132.8°F) for a minimum of 30 minutes. Treatments must be conducted in USDA-approved facilities. Contact CPHST in Raleigh, NC for facility specifications.

T405—Bags and Bagging Materials

See T306 schedules

T406—Golden Nematode Contaminations

T406-a Miscellaneous cargo (nonfood, nonfeed commodities)

Pest: *Globodera rostochiensis* (golden nematode)

Treatment: T406-a—MB in 26" vacuum, use T403-c

T406-c Piers, barges, railroad cars, automobiles, used farm equipment, etc.

Pest: *Globodera rostochiensis* (golden nematode)

Treatment: T406-c—Steam Cleaning

Steam at high pressure until all soil is removed. Treated surfaces should be thoroughly wet and heated. The debris and/or runoff from the cleaning procedure must be handled in a manner approved by local and port authority guidelines.

T406-b Used farm equipment, construction equipment, containers, etc.

Pest: *Globodera rostochiensis* (golden nematode)

Treatment: T406-b—MB ("Q" label only) at NAP—tarpaulin or chamber

Temperature	Dosage Rate (lb/ 1,000 ft ³)	Minimum Concentration Readings (ounces) At:		
		0.5 hr	2 hrs	24 hrs
60°F or above	15 lbs	180	120	120



Soil should be easily crumbled but not wet. The soil should not exceed 12 inches in the smallest dimension.

T406-d

Used farm equipment (without cabs), construction equipment (without cabs), and used containers

Pest: *Globodera rostochiensis* (golden nematode)

Treatment: T406-d—Steam at NAP—tarpaulin, or tent

Steam heat for 60 minutes after all temperature sensors reach 140°F (60°C). (see sensor placement and other requirements below)



This treatment must be conducted under the following minimum ambient air temperatures, which will vary with the volume of the treatment enclosure:

—For treatment enclosures of 4,000 ft³ or less, the minimum air temperature is 40°F.

—For treatment enclosures greater than 4,000 ft³ and less than or equal to 6,000 ft³, the minimum air temperature is 60°F.

This treatment is not recommended for treatment enclosures greater than 6,000 ft³.

Step 1—Determine if the temperature and volume requirements can be met

If you cannot meet the temperature and enclosure volume requirements, do not use this treatment.

Step 2—Assemble articles to be treated

Articles to be treated should be placed as close together as possible. Arrange articles to allow space for placement of the steam distribution manifold.

Step 3—Place the steam distribution manifold pipe beneath articles to be treated

The steam distribution manifold should be assembled and placed beneath the articles to be treated in order to facilitate steam distribution. A flexible steam introduction hose, approximately 20 feet in length, connects the steam generator to a 10 foot long U-shaped pipe capped at the ends, with 0.5 inch holes every 12 inches. This pipe serves as the steam distribution manifold.

Step 4—Place temperature recording sensors on the article to be treated

Enclosures of 4,000 ft³ or less

When the treatment is being conducted in enclosures 4,000 ft³ or less, use at least four temperature recording sensors in addition to the sensor on the steam generator. Place sensors in hard-to-treat cracks or crevices on the equipment or containers. Position sensors in the following locations:

**Enclosures
greater than
4,000 ft³ and
less than or
equal to 6,000
ft³**

1. Front high—near the top of the front of the equipment or load
2. Center middle—midway from the top and bottom of the center of the equipment or load
3. Center bottom—bottom of the center of the equipment or load, but at least 3 inches above the floor if the equipment is flush with the floor
4. Rear bottom—bottom of the rear of the equipment, but at least 3 inches above the floor if the equipment is flush with the floor

When the treatment is being conducted in enclosures greater than 4,000 ft³ and less than or equal to 6,000 ft³, use at least eight temperature recording sensors in addition to the sensor on the steam generator. Again, place sensors in hard-to-treat cracks or crevices on the equipment or containers. Position probes in the following locations:

1. Front high—near the top of the left side of the front of the equipment or load
2. Front low—bottom of the right side of the front of the equipment or load, but at least 3 inches above the floor if the equipment is flush with the floor
3. Center high—near the top of the center of the equipment or load on the right side
4. Center middle—midway from the top and bottom of the center of the equipment or load
5. Center low—bottom of the center of the equipment or load on the left side, but at least 3 inches above the floor if the equipment is flush with the floor
6. Rear high—near the top of the rear of the equipment on the right side
7. Rear middle—midway from the top and bottom of the rear of the equipment
8. Rear low—bottom of the rear of the equipment or load on the left side, but at least 3 inches above the floor if the equipment is flush with the floor.

Step 5—Enclose the article to be treated with a tarpaulin or tent

If a tarpaulin (6 mil plastic) is used instead of a tent, pad sharp edges of the equipment or containers before covering with the tarp.

If the equipment or containers will be moved into an enclosure, such as a tent, it may be more practical to place the temperature sensors after this step. In either case, the front of the equipment or load and the front of the enclosure should face in the same direction.

Step 6—Place the steam generator at an open end of the enclosure and seal the enclosure

The steam generator is placed approximately 20 feet from the front of the enclosure and connected to a steam introduction line (hose.) The steam introduction line is connected to the steam distribution manifold pipe which is situated under the articles to be treated. The enclosure is sealed at the base including the point at which the introduction line enters the enclosure. An airtight seal is not essential for steam treatment; therefore small pinholes are acceptable.

Step 7—Steam heat the enclosure for 60 minutes after all temperature sensors reach a minimum 140°F (60°C)



Important

Use only a steam generator approved by APHIS.

The maximum temperature in the enclosure should not exceed 160°F (71°C).

The temperature should be recorded once every 2 minutes during the treatment.

T407—Mechanical Cotton Pickers and Other Cotton Equipment

T407

Mechanical cotton pickers and other cotton equipment

Pest: *Pectinophora gossypiella* (pink bollworm)

Treatment: T407—MB (“Q” label only) at NAP—tarpaulin, chamber, railroad car, or van

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:				
		0.5 hr	2 hrs	3 hrs	4 hrs	12 hrs
40°F or above	4 lbs	48	—	—	—	21
	8 lbs	96	—	64	—	—



Important

This treatment is designed to kill exposed larvae, larvae within green cotton bolls or single locks of seed cotton, or loose trash. Any materials such as sacked or bulked seed, cotton waste, lint, linters, or any packaged commodity shall be treated in accordance with T301.

T408—Soil as Such and Soil Contaminating Durable Commodities

T408-e-1 Herbarium specimens of mosses and liverworts in soil and originating in golden nematode free countries

Pest: (Precautionary)

Treatment: T408-e-1—MB (“Q” label only) in 26" vacuum (Precautionary fumigation)

Temperature	Dosage Rate (lb/1,000 ft ³)	Exposure Period
70°F or above	2 lbs	3.5 hrs

T408-e-2 Herbarium specimens of mosses and liverworts in soil and originating in golden nematode free countries

Pest: *Globodera rostochiensis* (golden nematode)

Treatment: T408-e-2—MB (“Q” label only) in 26" vacuum

Temperature	Dosage Rate (lb/1,000 ft ³)	Exposure Period
40°F or above	8 lbs	16 hrs
	10.5 lbs	12 hrs
	16 lbs	8 hrs

T408-a Soil as such

Two alternative treatments

Pest: Various pests and pathogens found in soil (including striga)

Treatment: T408-a—Dry heat—

Temperature	Exposure Period
230°F to 249°F	16 hours
250°F to 309°F	2 hours
310°F to 379°F	30 minutes
380°F to 429°F	4 minutes
430°F to 450°F	2 minutes

Soil to be spread in layers 0.5 inches in depth to ensure uniform heat penetration. The exposure period does not begin until the entire mass reaches 250°F.

T408-b Soil as such

Pest: Various pest and pathogens found in soil

Treatment: T408-b—Steam—250°F at 15 lbs pressure (p.s.i.) for 0.5 hour

Preheat laboratory autoclaves. Restrict soil depth to 2 inches when treating quantities of soil in trays. Restrict each package weight to 5 lbs. or less when treating individual packages. Load with adequate spacing. Large commercial steam facilities which operate at pressures up to 60 lbs. psi will permit treatment of greater soil depth.

T408-b-1

Soil contaminating durable commodities (e.g., equipment, cobblestone, marble)

Pest: Various pests and pathogens found in soil

Treatment: Steam Cleaning

Steam at high pressure until all soil is removed. Treated surfaces should be thoroughly wet and heated. The debris and/or runoff from the cleaning procedure must be handled in a manner approved by local and port authority guidelines.

T408-c-1

Soil as such

Two alternative treatments

Pest: *Globodera rostochiensis* (golden nematode)

Treatment: T408-c-1—MB (“Q” label only) in 26" vacuum, see [T403-c](#) on [page 5-5-11](#) for loose and friable material only.

Soil to be fumigated in containers—no dimensions of which can exceed 24 inches.

T408-c-2

Soil as such

Pest: *Globodera rostochiensis* (golden nematode)

Treatment: T408-c-2—MB (“Q” label only) at NAP—tarpaulin or chamber

Temperature	Dosage Rate (lb/ 1,000 ft ³)	Minimum Concentration Readings (ounces) At:		
		0.5 hr	2 hrs	24 hrs
60°F or above	15 lbs	180	120	72



Important

Soil should be friable, moist, but not wet. Soil must not be more than 12 inches in depth. If stacked in containers, 12 inches of space must be left between levels.

T408-d-1

Soil as such

Two alternative treatments

Pest: Insects

Treatment: T408-d-1—Screening through 16 mesh screens will remove most larvae and pupae, except smaller types.

T408-d-2

Treatment: T408-d-2—Freezing—0°F for 5 days

T408-f

Soil contaminated durable commodities (e.g., equipment, cobblestone, marble)(precautionary treatment)

Pest: Soil fungi, nematodes, and certain soil insects

Treatment: T408-f—Steam Cleaning

Steam at high pressure until all soil is removed. Treated surfaces should be thoroughly wet and heated.

The debris and/or runoff from the cleaning procedure must be handled in a manner approved by local and port authority guidelines.

T408-g-1

Soil contaminated nonfood or nonfeed commodities

Two alternative treatments

Pest: *Striga* spp. (witchweed)

Treatment: T408-g-1—MB (“Q” label only) (tarpaulin)

Temperature	Dosage Rate (lb/1,000 ft ³)	Exposure Period
60°F or above	10 lbs	24 hrs
	20 lbs	15.5 hrs

T408-g-2

Soil contaminated nonfood or nonfeed commodities

Pest: *Striga* spp. (witchweed)

Treatment: T408-g-2—MB (“Q” label only) (tarpaulin)

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:		
		0.5 hr	2 hrs	24 hrs
60°F or above	15 lbs	164	120	72



Important

Soil must be friable, moist, but not wet. The soil shall not exceed 12 inches in least dimension.

T409—Aircraft

T409-a

Aircraft

Pest: *Trogoderma granarium* (khapra beetle)

Treatment: T409-a



Contact Regional Director for specific instructions.

T409-b

Aircraft

Pest: Hitchhiking pests other than khapra beetle, fruit flies, and soft-bodied insects

Treatment: T409-b—d-phenothrin aerosols (10%)—apply at rate of 8g/1,000 ft³



Aerosol disinfestation of U.S. military aircraft must conform to requirements in the latest edition of “Quarantine Regulations of the Armed Forces” (Army Reg. 40-12; SECNAVINST 6210.2A; AFR 161-4).

Currently, d-phenothrin aerosol (10%) is available from Sumitomo Chemical Company LTD, 5-33, Kitahama 4-Chrome, Chuo-ku, Osaka 541-8550, Japan (EPA Reg. No. 10308-21)

Determine the number of seconds to spray the aerosol

The time needed to spray the aerosol is a function the following three things:

- ◆ Volume of the aircraft (in 1000 cubic feet)
- ◆ Spray rate of the nozzle (in grams per second)
- ◆ Required application rate for the pesticide (in grams per 1000 cubic feet)

This relationship is shown in the following formula:

$$\text{Volume of Aircraft} \times \left(\frac{\text{Required Application Rate}}{\text{Spray Rate of Nozzel}} \right) = \text{Time Needed to Spray Aersol}$$

Use [Table 5-5-1](#) on page 5-5-30 through [Table 5-5-23](#) on page 5-5-40 to determine the spray time when using 10 percent d-phenothrin, which requires an application rate of 8 grams per 1000 cubic feet, and a nozzle with a spray rate of 5 gram per second.



Currently, d-phenothrin aerosol (10 percent) is available from Sumitomo Chemical Company LTD, 5-33, Kitahama 4-Chrome, Chuo-ku, Osaka 541-8550, Japan (EPA Reg. No. 10308-21). The labeled application rate is 8 grams per 1000 cubic feet, and the spray rate of the aerosol can is 5 grams per second. Calculations for spray times beginning with [Table 5-5-1](#) on page 5-5-30 are based on the spray rate of 5 gram per second. To have better control of spray times of one second or less, you can use an extender tube on the nozzle of the aerosol can. The extender tube can cut the spray rate in half. For example, if a can of d-phenothrin normally sprays at a rate of 5 grams per second, the extender tube would reduce this rate to 2.5 grams per second and the correct spraying time would then be twice the time listed beginning with [Table 5-5-1](#) on page 5-5-30.

Also, the aircraft volumes in Table 5-5-1 represent standard configurations of aircraft. Check with the captain or contact the follow manufacturers to determine if the aircraft has been modified from the standard configuration, and determine the actual volume.

Airbus Industries of North America, Inc.

593 Herndon Parkway
Herndon, VA 20170
Telephone: (703) 834-3400
Fax: (703) 834-3550
Website: <http://www.airbus.com/body.html>

Boeing Commercial Aeroplane Group

P.O. Box 3707, Mail Stop 74-31
Seattle, WA 98124-2207
Telephone: (425) 237-3657
Website: <http://www.boeing.com/commercial.com>

Fairchild Aerospace Corp.

P.O. Box 790490
San Antonio, TX 78279-0490
Telephone: (210) 824-2313

McDonald-Douglas Corporation

Military Aircraft Section
P.O. Box 516
St. Louis, MO 63166
Telephone: (314) 233-5360
Fax: (314) 232-7528

Aerospatiale

Website: <http://www.aerospatiale.fr/products/avions>

Casa

Website: <http://www.casa.es252>

Determine the Spray Time for 10% d-phenothrin with a labeled application rate of 8 grams per 1000 cu. ft. and nozzle dispersion rate of 5 grams per second

TABLE 5-5-1: Airbus Industries

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
A300	Cabin	27,100	27.1	8	43.5
	Pit-#1	3,722	3.7	8	6.0
	Pit-#2	1,265	1.3	8	2.0
	Pit-#3	565	.6	8	1.0
A300-600R (passenger) (long-range)	Cabin	?			?
	Forward	1,134	1.1	8	2.0
	Aft	1,134	1.1	8	2.0
	Bulk	400	.4	8	0.5
A300-600 (freighter)	Main	9,950	10.0	8	16.0
	Pit-Fwd	1,900	1.9	8	3.0
	Pit-Aft	2,250	2.2	8	3.5
A300-600 (FEDEX)	Main	19,069	19.1	8	30.5
	Pit-Fwd	2,684	2.7	8	4.5
	Pit-Aft	2,154	2.2	8	3.5
	Pit-Back	742	.7	8	1.0
A300 (convertible)	Main	11,943	11.9	8	19.0
A300B4 (freighter)	Main	9,950	10.0	8	16.0
	Pit-Fwd	1,900	1.9	8	3.0
	Pit-Aft	1,850	1.9	8	3.0
A310 (freighter)	Main	7,950	8.0	8	13.0
	Pit-Fwd	1,260	1.3	8	2.0
	Pit-Aft	1,550	1.6	8	2.5
A310 (FEDEX)	Main	14,650	14.7	8	23.5
	Pit-Fwd	1,942	1.9	8	3.0
	Pit-Aft	1,271	1.3	8	2.0
	Pit-Back	742	.7	8	1.0
A320-200 (passenger)	N/A	982	.9	8	1.5

TABLE 5-5-2: Antonov

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
AN 124 and 126	N/A	26,485	26.5	8	42.5

TABLE 5-5-3: ATR

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
ATR 42 (CTO) (Container Transport Option)	Bulk	890	.9	8	1.5
ATR 72 (CTO)	Bulk	1,285	1.3	8	2.0

TABLE 5-5-4: BAC (British Aircraft Corp)

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
111-200, 300, and 400	Cabin	4,056	4.1	8	6.5
	Pit-Fwd	380	.4	8	0.5
	Pit-Aft	154	.2	8	0.5
111-500	Cabin	5,094	5.1	8	8.0
	Pit-Fwd	451	.5	8	1.0
	Pit-Aft	260	.3	8	0.5
VC 10	Cabin	6,750	6.8	8	11.0
	Pit-Fwd	744	.7	8	1.0
	Pit-Aft	820	.8	8	1.5
Super VC 10	Cabin	7,850	7.9	8	12.5
	Pit-Fwd	744	.7	8	1.0
	Pit-Aft	820	.8	8	1.5

TABLE 5-5-5: BAC (Aerospatiale)

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
Concorde	Cabin	5,100	5.1	8	8.0
	Pit-Fwd	241	.2	8	0.5
	Pit-Aft	468	.5	8	1.0

TABLE 5-5-6: Boeing

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
707-120, 120B, and 220	Cabin	7,484	7.5	8	12.0
	Pit-Fwd	755	.8	8	1.5
	Pit-Aft	910	.9	8	1.5
	Fl. Deck	451	.5		1.0
707-320C	Bulk	7,548	7.5	8	12.0
707-320, 420	Cabin	8,074	8.0	8	13.0
	Pit-Fwd	870	.9	8	1.5
	Pit-Aft	905	.9	8	1.5
	Fl. Deck	451	.5	8	1.0
720	Cabin	6,860	6.9	8	11.0
	Pit-Fwd	688	.7	8	1.0
	Pit-Aft	690	.7	8	1.0
	Fl. Deck	451	.5	8	1.0
727-100C	Bulk	4,168	4.2	8	7.0
727-100 (passenger)	Cabin	4,560	4.6	8	7.5
	Pit-Fwd	900	.9	8	1.5
	Pit-Aft	425	.4	8	0.5
	Fl. Deck	451	.5	8	1.0
727-200C	Bulk	8,032	8.0	8	13.0
727-200 (passenger)	Cabin	6,561	6.6	8	10.5
	Pit-Fwd	690	.7	8	1.0
	Pit-Aft	760	.8	8	1.5
	Fl. Deck	451	.5	8	1.0
737-100	Cabin	4,636	4.6	8	7.5
	Pit-Fwd	280	.3	8	0.5
	Pit-Aft	406	.4	8	0.5
737-200 (passenger)	Cabin	4,636	4.6	8	7.5
	Pit-Fwd	370	.4	8	0.5
	Pit-Aft	505	.5	8	1.0
737-200C	Bulk	3,602	3.6	8	6.0
737-300	Cabin	4,900	4.9	8	8.0
	Pit-Fwd	425	.4	8	1.0
	Pit-Aft	650	.7	8	1.0
	Fl. Deck	225	.3	8	0.5
737-400	Cabin	5,600	5.6	8	9.0
	Pit-Fwd	600	0.6	8	1.0
	Pit-Aft	770	0.8	8	1.5
	Fl. Deck	225	0.2	8	0.5
737-500	Cabin	4,340	4.3	8	7.0
	Pit-Fwd	290	.3	8	0.5
	Pit-Aft	535	.5	8	1.0
	Fl. Deck	255	.3	8	0.5
747 Combi	—	6,886	6.9	8	11.0
747F	—	22,952	23.0	8	37.0

TABLE 5-5-6: Boeing (continued)

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
747-100, 200	Cabin	27,650	27.7	8	44.5
	Pit-Fwd	3,485	3.5	8	6.0
	Pit-Aft	3,015	3.0	8	5.0
	Fl. Deck	920	.9	8	1.5
	U. Deck	1,370	1.4	8	2.0
	Belly	1,000	1.0	8	1.5
747-300,400	Cabin	27,650	27.7	8	44.5
	Pit-Fwd	3,485	3.5	8	5.5
	Pit-Aft	3,015	3.0	8	5.0
	Fl. Deck	920	.9	8	1.5
	U. Deck	2,800	2.8	8	4.5
	Belly	1,000	1.0	8	1.5
757-200 (passenger)	Pit-Fwd	652	.6	8	1.0
	Pit-Aft	1,086	1.1	8	2.0
757-200PF	Bulk	8,405	8.4	8	13.5
767-200	Main	14,255	14.3	8	23.0
	Pit-Fwd	1,470	1.5	8	2.5
	Pit-Aft	1,470	1.5	8	2.5
767-300 (passenger)	Cabin	10,497	10.5	8	17.0
	Pit-Fwd	1,920	1.9	8	3.0
	Pit-Aft	1,680	1.7	8	2.5
	Aft+Bulk	430	.4	8	0.5
777-200	Cabin	20,700	20.7	8	33.0
	Pit-Fwd	280	.3	8	0.5
	Pit-Aft	4,630	4.6	8	7.5
	Aft+Bulk	4,220	4.2	8	6.5

TABLE 5-5-7: Canadair

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
CL-44	Bulk	6,235	6.2	8	10.0
CL-440	Bulk	13,798	13.8	8	22.0

TABLE 5-5-8: Casa

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
C-212	N/A	777	.8	8	1.5
ATR 72 (CTO)	N/A	1,528	1.5	8	2.5

TABLE 5-5-9: Cessna

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
Caravan	N/A	452	.5	8	1.0

TABLE 5-5-10: Convair

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
240	Cabin	1,650	1.7	8	2.5
	Pit-Fwd	193	.2	8	0.5
	Belly	88	.1	8	— ¹
340 & 44-	Cabin	1,816	1.8	8	3.0
	Pit-Fwd	158	.2	8	0.5
	Pit-Aft	193	.2	8	0.5
	Belly	78	.1	8	— ¹
880 & 800M	Cabin	5,802	5.8	8	9.5
	Pit-Fwd	415	.4	8	0.5
	Pit-Aft	488	.5	8	1.0
990	Cabin	6,336	6.3	8	10.0
	Pit-Fwd	488	.5	8	1.0
	Pit-Aft	497	.5	8	1.0

1 In these small volume spaces, use the extender and calculate the application time using a rate of 2.5 grams per second. At a rate of 2.5 grams per second, the following table will give the spray time:

1,000 ft³ Units Spray Time in Seconds

0.10.5
0.20.5
0.31.0
0.41.5

TABLE 5-5-11: de Havilland

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
Dash 7, Series 100 (all cargo)	N/A	240	.2	8	0.5
DHC-6 Twin	Fwd	38	.1	8	— ¹
Otter, Series	Aft	88	.1	8	— ¹
300 (cargo version)	Bulk	384	.4	8	0.5
Dash 7, Series 100, Combi (50 passengers)	N/A	240	.2	8	0.5

TABLE 5-5-11: de Havilland

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
Dash 7, Series 100, Combi (18 passengers)	N/A	240	.2	8	0.5
Dash 8, Series 300, Combi (49 passengers)	N/A	400	.4	8	0.5
Dash 8, Series 100, Combi (37 passengers)	N/A	300	.3	8	0.5
Dash 8, Series 100, Combi (20 passengers)	N/A	775	.8	8	1.5

- 1 In these small volume spaces, use the extender and calculate the application time using a rate of 2.5 grams per second. At a rate of 2.5 grams per second, the following table will give the spray time:

1,000 ft³ Units Spray Time in Seconds

0.10.5
0.20.5
0.31.0
0.41.5

TABLE 5-5-12: Dornier

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
228-212	N/A	642	.6	8	1.0

TABLE 5-5-13: Embraer

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
EMB-120 Brasilia	N/A	1,193	1.2	8	2.0
EMB-110 Brasilia	N/A	523	.5	8	1.0

TABLE 5-5-14: Fairchild

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
Expediter	NA	580	.6	8	1.0
Metro II & IIA	NA	580	.6	8	1.0
F27	Cabin	2,900	2.9	8	4.5
	Pit	192	.2	8	0.5
FH11227	Cabin	3,200	3.2	8	5.0
	Pit	192	.2	8	0.5

TABLE 5-5-15: Fokker

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
F27	N/A	198	.2	8	0.5
F28	N/A	290	.3	8	0.5
F100C	Bulk	2,070	2.0	8	3.0

TABLE 5-5-16: Lockheed

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
Electra	Cabin	5,160	5.2	8	8.5
	Pit-Fwd	254	.3	8	0.5
	Pit-Aft	274	.3	8	0.5
L1011 (100) (200) (250)	Cabin	23,100	23.1	8	37.0
	Pit-Fwd	1,600	1.6	8	2.5
	Pit-Ctr	1,600	1.6	8	2.5
	Pit-Aft	700	.7	8	1.0
	Galley	1,380	1.4	8	2.0
L-1011-1	Cargo Holds	3,900	3.9	8	6.0
L-100-30	N/A	6,057	6.1	8	10.0

TABLE 5-5-17: McDonnell-Douglas

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
DC-3	Bulk	1,300	1.3	8	2.0
DC-6 (cargo)	Bulk	3,354	3.4	8	5.5
DC-6 (passengers)	Cabin	4,332	1.3	8	7.0
	Pit-Fwd	200	.2	8	0.5
	Pit-Aft	173	.2	8	0.5

TABLE 5-5-17: McDonnell-Douglas (continued)

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
DC-6A	Cabin	4,375	4.4	8	7.0
	Pit-Fwd	267	.3	8	0.5
	Pit-Aft	300	.3	8	0.5
DC-6B	Cabin	4,375	4.4	8	7.0
	Pit-Fwd	276	.3	8	0.5
	Pit-Aft	242	.2	8	0.5
DC-7B	Cabin	4,612	4.6	8	7.0
	Pit-Fwd	267	.3	8	0.5
	Pit-Aft	364	.4	8	0.5
DC-7C	Cabin	4,778	4.8	8	7.5
	Pit-Fwd	312	.3	8	0.5
	Pit-Aft	339	.3	8	0.5
DC-8-50	Cabin	12,911	12.9	8	20.5
	Pit-Fwd	690	.7	8	1.0
	Pit-Aft	700	.7	8	1.0
DC-8-54F	Main	5,984	6.0	8	9.5
	Pit-Fwd	690	.7	8	1.0
	Pit-Aft	700	.7	8	1.0
DC-8-55F	Main	5,878	5.9	8	9.5
	Pit-Fwd	690	.7	8	1.0
	Pit-Aft	700	.7	8	1.0
DC-8-61 & 63	Cabin	15,955	16.0	8	25.5
	Pit-Fwd	1,290	1.3	8	2.0
	Pit-Aft	1,210	1.2	8	2.0
DC-8-62	Cabin	13,739	13.7	8	22.0
	Pit-Fwd	799	.8	8	1.5
	Pit-Aft	816	.8	8	1.5
DC-8-62CF	Main	6,442	6.4	8	10.0
	Pit-Fwd	800	.8	8	1.5
	Pit-Aft	815	.8	8	1.5
DC-8-63F and DC-8-73F	Main	10,350	10.4	8	16.5
	Pit-Fwd	1,290	1.3	8	2.0
	Pit-Aft	1,210	1.2	8	2.0
DC-8-71CF	Main	8,148	8.1	8	13.0
	Pit-Fwd	1,290	1.3	8	2.0
	Pit-Aft	1,210	1.2	8	2.0
DC-8-61CF & 71CF	Main	15,472	15.5	8	25.0
	Pit-Fwd	1,290	1.3	8	2.0
	Pit-Aft	1,210	1.2	8	2.0
DC-9-10	Cabin	4,056	4.1	8	6.5
	Pit-Fwd	1,000	1.0	8	1.5
	Pit-Aft	619	0.6	8	1.0
DC-9-10AF	Main	2,386	2.4	8	4.0
	Pit-Fwd	373	.4	8	0.5
	Pit-Aft	327	.3	8	0.5

TABLE 5-5-17: McDonnell-Douglas (continued)

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
DC-9-30	Cabin	5,094	5.1	8	8.0
	Pit-Fwd	1,386	1.4	8	2.0
	Pit-Aft	832	.8	8	1.5
DC-9-32AF	Main	3,300	3.3	8	5.5
	Pit-Fwd	562	.6	8	1.0
	Pit-Aft	333	.3	8	0.5
DC-9-33CF	Main	2,944	2.9	8	4.5
	Pit-Fwd	562	.6	8	1.0
	Pit-Aft	333	.3	8	0.5
DC-40	Cabin	5,535	5.5	8	9.0
	Pit-Fwd	1,290	1.3	8	2.0
	Pit-Aft	1,040	1.0	8	1.5
DC-10-10CF & 10F, also DC-10-30CF & 30F	Main	12,236	12.2	8	19.5
	Pit-Fwd	3,020	3.0	8	5.0
	Pit-Ctr	1,935	1.9	8	3.0
	Pit-Aft	510	.5	8	1.0
	Fl. Deck	400	.4	8	0.5
MD 8-61/63	Main	11,173	11.2	8	18.0
	Pit-Fwd	1,290	1.3	8	2.0
	Pit-Aft	1,210	1.2	8	2.0
MD8-62	Main	8,862	8.9	8	14.0
	Pit-Fwd	800	.8	8	1.5
	Pit-Aft	815	.8	8	1.5
MD9-10	Main	3,582	3.6	8	6.0
	Pit-Fwd	393	.4	8	0.5
	Pit-Aft	254	.3	8	0.5
MD9-30	Main	4,525	4.5	8	7.0
	Pit-Fwd	562	.6	8	1.0
	Pit-Aft	333	.3	8	0.5
MD9-40	Main	4,926	4.9	8	8.0
	Pit-Fwd	618	.6	8	1.0
	Pit-Aft	350	.4	8	0.5
MD-11F	Main Deck	15,530	15.5	8	25.0
	Lower Deck	4,976	5.0	8	8.0
MD-11 Combi	Main	5,822	5.8	8	9.5
	Pit-Fwd	3,655	3.7	8	6.0
	Pit-Ctr	2,685	2.7	8	4.5
	Pit-Aft	510	.5	8	1.0
MD-80 JT8D-217	Lower Hold	1,253	1.3	8	2.0
MD-80 JT8D-219	Lower Hold	1,013	1.0	8	1.5
MD 81 & 82	Cargo	1,253	1.3	8	2.0
MD-83	Cargo	1,013	1.0	8	1.5

TABLE 5-5-17: McDonnell-Douglas (continued)

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
MD-87	Cargo	938	.9	8	1.5
		or 697	.7	8	1.0
MD-88	Cargo	1,013	1.0	8	1.5
		or 1,253	1.3	8	2.0

TABLE 5-5-18: SAAB

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
340 B/QC	N/A	1,303	1.3	8	2.0

TABLE 5-5-19: Shorts

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
330	N/A	1,230	1.2	8	2.0
360 and 360-F	N/A	1,450	1.5	8	2.5

TABLE 5-5-20: Sidely

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
Carvelle	Cabin	5,600	5.6	8	9.0
	Pit-Fwd	258	.3	8	0.5
	Pit-Aft	116	.1	8	. ¹

- 1 In these small volume spaces, use the extender and calculate the application time using a rate of 2.5 grams per second. At a rate of 2.5 grams per second, the following table will give the spray time:

1,000 ft³ Units Spray Time in Seconds

0.10.5
0.20.5
0.31.0
0.41.5

TABLE 5-5-21: Tupolev

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
TU-154	Bulk	5,000	5.0	8	8.0

TABLE 5-5-22: Vickers

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
Merchantman	Bulk	5,040	5.0	8	8.0
Viscount	Bulk	3,000	3.0	8	5.0

TABLE 5-5-23: Military Aircraft

Aircraft, model, and series	Area	Volume ft ³	Aerosol Calculations		
			1,000 ft ³ Units	Grams/ 1,000 ft ³	Spray Time in Seconds
C-5A	Main	46,651	46.7	8	74.5
	U. Deck	6,147	6.1	8	10.0
	Fwd. & Fl. Deck	5,147	5.1	8	8.0
	U. Floor	6,294	6.3	8	10.0
C-17	Main	20,875	20.9	8	33.5
C-26	Cabin	500	.5	8	1.0
	Pit	198	.2	8	0.5
C-130	Main	8,340	8.3	8	13.5
C-130 LG382		4,737	4.7	8	7.5
C-130 LG385-G		6,057	6.1	8	10.0
C-135	Cabin	6,000	6.0	8	9.5
C-141	Main	12,000	12.0	8	19.0
C-141B	Main	13,701	13.7	8	22.0
KC-10	Cabin	4,056	4.1	8	6.5
	Pit-Fwd	1,000	1.0	8	1.5
	Pit-Aft	619	.6	8	1.0

T410—Tick Infestations

Nonplant articles (i.e., bat guano, fence posts, etc.)

Pest: Ticks

Treatment: Use T310 schedules, Tick-infested materials (nonfood)

T411—Ant Infestations—Nonplant Products

T411

Pest: Ants

Treatment: T411—MB at NAP

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:				
		0.5 hr	2.5 hrs	3 hrs	3.5 hrs	4 hrs
90-96°F	2 lbs	24	16	—	—	—
80-89°F	2.5 lbs	30	24	—	—	—
70-79°F	3 lbs	36	24	—	—	—
60-69°F	3 lbs	36	—	24	—	—
50-59°F	3 lbs	36	—	—	24	—
40-49°F	3 lbs	36	—	—	—	24

T412—Noxious Weed Seeds (Devitalization Treatment)

T412-a

Guizotia abyssinica (niger seed)

Pest: Weed seeds of the following genera:
Asphodelus fistulosus (onionweed)
Digitaria spp. (includes African couchgrass)
Oryza spp. (red rice)
Paspalum scrobiculatum (Kodo-millet)
Prosopis spp. (includes mesquites)
Solanum viarum (tropical soda apple)
Striga spp. (witchweed)
Urochloa panicoides (liver-seed grass)

Treatment: T412-a—Dry Heat Treatment at 248°F (120°C) for 15 minutes



Important

Do not start counting time until the entire mass reaches the required temperature.

T412-b-1

Noxious weed seeds (devitalization treatment)

Pest: *Cuscuta* spp.

Two alternative treatments

Treatment: T412-b-1—Dry heat—commodity heated to 212°F (100°C) for 15 minutes

T412-b-2 Noxious weed seeds (devitalization treatment)

Pest: *Cuscuta* spp.

Treatment: T412-b-2—Steam heat—commodity heated to 212°F (100°C) for 15 minutes

T412-b-3 Deleted

T413—Brassware from Mumbai (Bombay), India

T413-a Brassware from Mumbai (Bombay), India

Two alternative treatments

Pest: *Trogoderma granarium* (khapra beetle)

Treatment: T413-a—MB at NAP—tarpaulin or chamber

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:		
		0.5 hr	2 hrs	12 hrs
90°F or above	2.5 lbs	30	20	15
80-89°F	3.5 lbs	42	30	20
70-79°F	4.5 lbs	54	40	25
60-69°F ¹	6 lbs	72	50	30
50-59°F	7.5 lbs	90	60	35
40-49°F ²	9 lbs	108	70	40

1 Use MB 100 gas at 60°F or above.

2 Use MB “Q” gas at 40°F or above.



When both woodborers and khapra beetles are involved, use schedule [T404-d](#) on [page 5-5-19](#).

T413-b Brassware from Mumbai (Bombay), India

Treatment: T413-b—MB in 26" vacuum

Temperature	Dosage Rate (lb/1,000 ft ³)	Exposure Period
60°F or above ¹	8 lbs	3 hrs
40-59°F ²	9 lbs	3 hrs

1 Use MB 100 gas at 60°F or above.

2 Use MB “Q” gas at 40°F or above.



Load limit is 75% of chamber volume.

T414—Inanimate, Nonfood Articles with Gypsy Moth Egg Masses

T414 Inanimate, nonfood articles with Gypsy Moth egg masses

Pest: Gypsy Moth egg masses

Treatment: T414—MB at NAP—tarpaulin or chamber

Temperature	Dosage Rate (lb/1,000 ft ³)	Minimum Concentration Readings (ounces) At:				
		0.5 hr	4 hrs	8 hrs	12 hrs	16 hrs
50°F or above	3.5 lbs	42	28	—	—	—
	2.5 lbs	30	20	14	—	—
	2 lbs	24	16	12	12	10
40-49°F	4.5 lbs	54	36	—	—	—
	3.25 lbs	38	26	18	—	—
	2.25 lbs	30	20	14	14	12



For *Lymantria dispar* (gypsy moth) egg masses on such items as outdoor household articles, quarry products, lumber, logs, and timber products.

T415— Garbage

Three alternative treatments are approved. The treatments can be used for commodity destruction.

T415-a Garbage

Pest: Insect pest and pathogens

Treatment: T415-a—Heat Treatment- Incinerate to ash.



Caterers under compliance agreement using an incinerator for garbage must comply with the following conditions:

- Incinerator must be capable of reducing garbage to ash
- Incinerator must be maintained adequately to assure continued operation

T415-b Garbage

Pest: Insect pest and pathogens

Treatment: T415-b—Dry heat or Steam- commonly heated to internal temperature of 212°F (100°C) for 30 minutes followed by burial in a landfill.



Caterers under compliance agreement using a sterilizer must comply with the following conditions:

The sterilizer must be capable of heating garbage to an internal temperature of 212° F and maintaining it at that temperature for a minimum of 30 minutes.

Reevaluate and adjust the sterilization cycle twice a year using a thermocouple to recalibrate the temperature recording device. Adjusting the sterilization cycle semiannually will assure that all garbage processed is heated to a minimum internal temperature of 212° F for at least 30 minutes, and that the temperature recording device accurately reflects the internal temperature of the sterilizer.



Observe all reevaluations and adjustments.

The operator is to date and initial time/temperature records for each batch of garbage sterilized. The supervisor is to review and sign each time/temperature record. The facility must retain records for 6 months for review by PPQ.

Clean the drain in the bottom of the sterilizer between each cycle to assure proper heat circulation

T415-C

Garbage

Pest: Insect pest and pathogens

Treatment: T415-c—Grinding and discharge into an approved sewage system



Grinding and discharging is allowed into an approved sewage system. An approved sewage system is designed and operated in such a way as to preclude the discharge of sewage effluents onto land surfaces or into lagoons or other stationary waters, is adequate to prevent the dissemination of plant pests and livestock or poultry diseases, and is certified by an appropriate government official as currently complying with the applicable laws for environmental protection.

T416—Goatskins, Lambskins, Sheepskins (Skins and Hides)

Three alternative treatments



Fur, horsehair articles, and leather goods (skins and hides), may cause off-odors that may be unacceptable when exposed to methyl bromide (MB).



Items known to be sorptive or items whose sorptive properties are unknown are not to be fumigated in chambers at NAP unless T/C readings are taken.

T416-a-1

Goatskins, lambskins, sheepskins (skins and hides)

Pest *Trogoderma granarium* (Khapra beetle)

Treatment MB ("Q" gas only) at NAP—tarpaulin

Temperature	Dosage Rate (lb/ 1,000 ft ³)	Minimum Concentration Readings (ounces) At:		
		0.5 hr	2 hrs	12 hrs
90°F or above	2.5 lbs	30	20	15
80-89°F	3.5 lbs	42	30	20
70-79°F	4.5 lbs	54	40	25
60-69°F	6 lbs	72	50	30
50-59°F	7.5 lbs	908	60	35
40-49°F	9 lbs	108	70	40

The sorptive rates of commodities vary. When a commodity is known or suspected to be sorptive (see [T307-a](#) on [page 5-4-19](#)), take more T/C readings than normal. Additional fumigant is added as prescribed on [Additional Readings](#) on [page 2-4-22](#).

When both woodborers and khapra beetles are involved, use schedule [T404-d](#) on [page 5-5-19](#).

T416-a-2

Goatskins, lambskins, sheepskins (skins and hides)



Load limit is 75% of chamber volume.

Pest *Trogoderma granarium* (Khapra beetle)

Treatment MB ("Q" label gas) in 26" vacuum

Temperature	Dosage Rate (lb/1,000 ft ³)	Exposure Period
60°F or above	8 lbs	3 hrs
40-59°F	9 lbs	3 hrs

T416-a-3

Goatskins, lambskins, sheepskins (skins and hides)

Pest *Trogoderma granarium* (Khapra beetle)

Treatment MB ("Q" gas only) in 26" vacuum—chamber

Temperature	Dosage Rate (lb/1,000 ft ³)	Exposure Period
90-96°F	2.5 lbs	12 hrs
80-89°F	3.5 lbs	12 hrs
70-79°F	4.5 lbs	12 hrs
60-69°F	6 lbs	12 hrs
50-59°F	10 lbs	12 hrs
40-49°F	12 lbs	12 hrs

Amount of Phosphine liberated by various products

Calculate amount of product needed by using the amount of phosphine released as shown in the right column.

TABLE 5-5-24: Amount of Phosphine Liberated by Various Products

Product	Type	Unit and weight in grams	Grams of phosphine*
Degesch Fumi-Cel®	MP	1 plate; 117.0	33.0
Degesch Fumi-Strip®	MP	16 plates; 1872.0	528.0
Degesch Phostoxin®	AP	1 tablet; 3.0	1.0
Degesch Phostoxin® Tablet Prepac Rope	AP	1 prepac; 99.0 (strip or rope of 33 tablets)	33.0
Detia	AP	1 tablet; 3.0	1.0
Detia Rotox AP	AP	1 pellet; 0.6	0.2
Detia Gas EX-B	AP	1 bag or sachet; 34.0	11.4
Fumiphos tablets	AP	1 tablet; 3.0	1.0
Fumiphos pellets	AP	1 pellet; 0.6	0.2
Fumiphos bags	AP	1 bag; 34.0	11.0
Fumitoxin	AP	1 tablet; 3.0	1.0
Fumitoxin	AP	1 pellet; 0.6	0.2
Fumitoxin	AP	1 bag; 34.0	11.0
Gastoxin	AP	1 tablet; 3.0	1.0
Gastoxin	AP	1 pellet; 0.6	0.2
"L" Fume	AP	1 pellet; 0.5	0.18
	AP	1 pellet; 0.6	0.22
Phos-Kill	AP	1 tablet; 3.0	1.1
Phos-Kill	AP	1 pellet; 0.6	0.22
Phos-Kill	AP	1 bag; 34.0	12.0

*Reacts with moisture in the air to yield grams of phosphine.

